ABSTRACT OF THE DISCLOSURE

The present invention provides permutation instructions which can be used in software executed in a programmable processor for solving permutation problems in cryptography, multimedia and other applications. The permute instructions are based on an omega-flip network comprising at least two stages in which each stage can perform the function of either an omega network stage or a flip network stage. Intermediate sequences of bits are defined that an initial sequence of bits from a source register are transformed into. Each intermediate sequence of bits is used as input to a subsequent permutation instruction. Permutation instructions are determined for permuting the initial source sequence of bits into one or more intermediate sequence of bits until a desired sequence is obtained. The intermediate sequences of bits are determined by configuration bits. The permutation instructions form a permutation instruction sequence, of at least one instruction. At most $2\lg r/m$ permutation instructions are used in the permutation instruction sequence, where r is the number of k-bit subwords to be permuted, and m is the number of network stages executed in one instruction. The permutation instructions can be used to permute k-bit subwords packed into an n-bit word, where k can be 1, 2, …, or n bits, and $k*r=n$.